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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,941	07/10/2003	Kazuki Takemoto	03560.003339.	1080

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EXAMINER	
BRIER, JEFFERY A	

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/615,941	TAKEMOTO ET AL.	
	Examiner	Art Unit	
	Jeffery A. Brier	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/08/2009 has been entered.

Response to Amendment

2. The amendment filed on 11/26/2008 has been entered.

Response to Arguments

3. Applicant's arguments filed 11/26/2008 have been fully considered but they are not persuasive in view of the newly discovered Shih US Patent No. 6,552,722. Shih teaches a virtual reality system that uses object constraints to control the visual interaction between the virtual objects and teaches the user may add the constraints while interacting with the virtual environment. Geometric constraints are described at column 37 line 17 to column 39 line 11.

Applicant argues at pages 9-11 that Kitamura does not teach:

constraining shape input means for specifying three-dimensional coordinates respectively of points on a constraining plane to indicate at the same time the shape and position of the constraining plane in said real space.

However, Shih teaches specifying three-dimensional geometric coordinates of points on a constraining plane to indicate at the same time both the shape and position of the constraining plane on a virtual object in virtual space with regard to allowing the user to interactively add constraints to the three-dimensional virtual objects, column 38 lines 9-23.

In view of Shih it would have been obvious to one of ordinary skill in the art at the time of applicants invention to modify Kitamura to include the claimed constraining shape input means because this will allow the user to interactively add constraints to the virtual objects in the real space which reduces the amount of précising required when the modeling of the augmented world is first produced, see applicants paragraph [0003] and Shih.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-3 and 5-7 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-3:

Applicants specification at paragraph 87 states the program itself may be the means, thus, the means of means plus function claims 1-3 is software only.

Claims 5-7:

Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

These method claims are not tied to a specific machine or apparatus and do not claim a physical transformation of an article or thing. In re Bilski, 88 USPQ2d 1385 (Fed. Cir. 2008). Even the image capturing step and the constraining shape input step are not tied to a machine since these steps are merely data gathering steps. Similarly the virtual object placement shape storage step is merely a data storage step. The virtual image generating step, synthesizing step, virtual object operating step, constraining shape generating step, and operation aiding step are data generating steps.

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshifumi Kitamura and Fumio Kishino, Consolidated Manipulation of Virtual and Real Objects, September 1997, Proceedings of the ACM symposium on Virtual reality software and technology, pages 133-138, in view of Shih, US Patent No. 6,552,722.

Kitamura teaches an augmented reality system that uses object constraints to control the visual interaction between the virtual objects and the real objects.

Shih teaches a virtual reality system that uses object constraints to control the visual interaction between the virtual objects and teaches the user may add the constraints while interacting with the virtual environment. Geometric constraints are described at column 37 line 17 to column 39 line 11.

Column 38 lines 9-23 states:

> Constraints can also be placed interactively by using the haptic interactive device 10, with the user feeling a force feedback effect when doing so. Thus the user can place a geometric constraint at or within a virtual object 26 using the haptic interactive device 10. The user then uses the haptic interactive device 10 to control a virtual tool 28 to modify the virtual object 26, with the movement of the virtual tool 28 limited by the geometric constraint. In another embodiment, the user makes a constraint, such as by using the virtual tool 28 to inscribe a slight groove in the virtual surface 25 of a virtual object 26. The user then uses this groove as a geometric constraint, when using the virtual tool 28 to enlarge the groove to make a larger indentation in the virtual surface 25 based on the shape of the groove.

Shih also discusses using a real world object in the virtual world at column 8 lines 38-41 which states:

> In one embodiment, the haptic virtual environment contains a virtual object 26 that is model of a real world object that a user is creating in the virtual environment.

A detailed analysis of the claims follows.

Claim 1:

Kitamura teaches Claim 1. (currently amended): An information processing device for aiding control operations relating to controlling the position and orientation of a virtual object, said device comprising:

image-capturing means for capturing a real object in real space into a taken image (Kitamura: The measurements by the user in three dimensional real space, the device for obtaining the 3-D shape by using a range image, and the device for obtaining the 3-D shape by using multiple cameras captures a real image in real space. The three paragraphs found in section 2 on page 134 of Kitamura teaches the user measuring the real objects, a device measuring the real objects with range in response to the user, or a device measuring the real objects with multiple cameras range in response to the user. The claim does not limit the form of the real image, thus, Kitamura teaches this limitation. Note applicants paragraph [0024] does not restrict the image capturing unit to a particular type);

virtual image generation means for generating a virtual image of a virtual object according to the position and orientation of said image capturing means (Kitamura: Kitamura discusses in section 2 in the first paragraph using conventional modeling software after precisely measuring the size or length of the real object by hand or by the devices which is an generation unit capable of generating three-dimensional positional

information. Sections 2, 4 and 5 discuss generating a virtual image(s) of a virtual object(s). Section 5 discusses virtual and real objects.);

synthesizing means for synthesizing the virtual image generated by said virtual image generation means with the taken image generated by said image-capturing means (Kitamura: Sections 2, 4, 5, and 6 discusses mixing the virtual and real world images of virtual and real world objects.);

virtual object placement shape storage means for storing the shape of the virtual object (Kitamura: Sections 2, 4, 5, and 6 discusses mixing the virtual and real world images of virtual and real world objects which requires storing the shape of both of the virtual and real world objects.);

virtual object operating means for performing six-degree-of-freedom operations of said virtual object (Kitamura: In view of page 135 first paragraph under the heading of 5 Consolidated Manipulation Environment of Kitamura the same 6 DOF tracker device is used to control the position of a virtual world object(s) and to control the position of a constraining real world object(s) which is similar to applicants system where stylus 1060 is used to control the virtual world object(s) and to control the location of the constraining real world object(s), see applicants paragraphs [0028], [0030], and [0041].);

Kitamura does not fully teach:

constraining shape input means for specifying three-dimensional coordinates respectively of points on a constraining plane to indicate at the same time the shape and position of the constraining plane in said real space;

Kitamura further teaches:

constraining shape generating means for generating a constraining shape based on at least one said constraining plane (Kitamura: Sections 3, 4, 5, and 6 discusses constraining shapes and introducing those shapes into the augmented reality world and figures 2, 4, and 5 illustrate and sections 5.1-5.4 discuss constraining shapes based on at least one constraining plane.); and

operation aiding means for generating restrictions on the operations performed by said virtual object operating means based on the shape stored in said virtual object placement shape storage means and the constraining shape generated by said constraining shape generating means (Kitamura: Sections 5.1 to 5.4 discusses manipulation of the virtual world object based upon constraint conditions based on the shape of the real world object in response to the user using the 6 DOF tracker device. The constraining shape generated from the three-dimensional position information constrains the interaction of the virtual world object with the real world object, see sections 2, 4 to 5.4. The introduction on page 133 second full paragraph discusses augmented reality which synthesizes a virtual object with a real object. Section 5.1

discusses after movement is detected by the 6DOF manipulator the virtual object is moved according to the constraints. Figures 2, 4, and 5 illustrate and sections 5.1-5.4 discuss constraining shapes based on at least one constraining plane).

As stated above Kitamura does not fully teach:

constraining shape input means for specifying three-dimensional coordinates respectively of points on a constraining plane to indicate at the same time the shape and position of the constraining plane in said real space.

However, Shih teaches specifying three-dimensional geometric coordinates of points on a constraining plane to indicate at the same time both the shape and position of the constraining plane on a virtual object in virtual space with regard to allowing the user to interactively add constraints to the three-dimensional virtual objects, column 38 lines 9-23.

It should be noted that Kitamura's use of the 6 DOF tracker device to control the position of the real world object suggests using the same 6 DOF tracker device to input the constraining shape of the real world object since this would require less input devices for the user to use and learn how to use. Additionally section 2 at lines 7-14 states "To bring an object that already exist in the real world into a computer-generated virtual world, it is necessary to construct accurate shape representation of the real object in a computer system. A traditional method for this is to use conventional modeling software after precisely measuring the size or length of the real object by

hand." which suggests using a computer input device to measure the real object in order to have accurate shape representation of the real object's constraining shape.

In view of Shih it would have been obvious to one of ordinary skill in the art at the time of applicants invention to modify Kitamura to include the claimed constraining shape input means because this will allow the user to interactively add constraints to the virtual objects in the real space which reduces the amount of precision required when the modeling of the augmented world is first produced, see applicants paragraph [0003], and because this will allow the user to add or modify constraints when the user is interacting with the virtual objects, see Shih column 38 lines 9-23.

Claim 2:

Claim 2. (previously presented): An information processing device according to Claim 1, wherein the constraining shape is defined by polygons (Kitamura: Figure 2's Cubes are formed with polygons.) and the apexes of the polygons are at positions inputted by the user (Kitamura: As discussed in the a setting unit above it would have been obvious to use the 6 DOF tracker device to input the constraining shape of the real world object which would input the apexes of the constraining shape of the polygon.) or the constraining shape is a plane passing through the positions inputted by the user (Kitamura: A real sensed surface is a planar real world object whose position is inputted by the user in the setting unit. As discussed in the a setting unit above it would have been obvious to use the 6 DOF tracker device to input the constraining

shape of the real world object which would input plane for a surface. Also section seciont 5.1 on page 136 discusses with regard to figure 2 a planar constraint.)..

Claim 3:

Claim 3. (currently amended): An information processing device according to Claim 1, wherein said operating aiding means performs at least one of the following operations in performing an operation controlling the position and orientation of the virtual object:

a translation operation for causing translational movement of the virtual object based on the constraining shape (Page 137 column 1 lines 1-3 teaches translation when the virtual object collides with the real surface.); and/or

a rotation operation for rotating the virtual object on an axis which is a normal vector at a plane where the constraining shape and the virtual object come into contact (Page 137 column 1 lines 1-3 teaches rotation when the virtual object collides with the real surface.) (Page 137 column 1 lines 1-3 also teaches translation and rotation when the virtual object collides with the real surface.). (For the added “and/” note page 137 column 1 lines 1-3 teaches translation and rotation.).

Claims 5-7:

These claims are method claim versions of means plus function device claims 1-3 and claim 5-7 are rejected for the same reasons given for claims 1-3.

Claim 8:

This claim is a computer readable medium claim version of device claim 1 and method claim 5 and claim 8 is rejected for the reasons given for device claim 1 and method claim 5. Additionally section 2 of Kitamura discusses computer systems performing the augmented reality which computer systems inherently have a compute readable medium.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Handley et al, 6,792,398 is similar to Shih. Geometric constraints are described at column 35 line 58 to column 38 line 13.

Column 36 lines 51-64 states:

> Constraints can also be placed interactively by using the haptic interactive device 10, with the user feeling a force feedback effect when doing so. Thus the user can place a geometric constraint at or within a virtual object 26 using the haptic interactive device 10. The user then uses the haptic interactive device 10 to control a virtual tool 28 to modify the virtual object 26, with the movement of the virtual tool 28 limited by the geometric constraint. In another embodiment, the user makes a constraint, such as by using the virtual tool 28 to inscribe a slight groove in the virtual surface 25 of a virtual object 26. The user then uses this groove as a geometric constraint, when using the virtual tool 28 to enlarge the groove to make a larger indentation in the virtual surface 25 based on the shape of the groove.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffery A. Brier whose telephone number is (571) 272-

7656. The examiner can normally be reached on M-F from 7:30 to 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached at (571) 272-7661. The fax phone Number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jeffery A. Brier/
Primary Examiner, Art Unit 2628